

4.2 Test Area North

Test Area North (TAN) was established in the 1950s by the U.S. Air Force and Atomic Energy Commission Aircraft Nuclear Propulsion Program to support nuclear-powered aircraft research. TAN is located approximately 50 miles northwest of Idaho Falls in the northern portion of the INEEL and extends over an area of approximately 12 square miles (see Figure 4-2). TAN is composed of two active operations areas: the Contained Test Facility and the Technical Support Facility (TSF). The third and fourth areas, the Water Reactor Research Test Facility (WRRTF) and the Initial Engine Test (IET) area, are inactive. TAN also maintains a small medical facility, a fire station, and a cafeteria.

The major program now located at the Contained Test Facility is the Specific Manufacturing Capability, which develops and produces tank armor for the U.S. Army. This program has a long-term mission and is managed by NE.

Three RODs exist for TAN: *Record of Decision for the Technical Support Facility (TSF) Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23)*, *Operable Unit 1-07A* (DOE-ID 1992b), *Record of Decision: Declaration for the Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23) and Miscellaneous No Action Sites Final Remedial Action, Operable Unit 1-07B* (DOE-ID 1995d), and *Final Record of Decision for Test Area North, Operable Unit 1-10* (DOE-ID 1999a). A ROD amendment, expected to be signed in January 2004, is titled *Record of Decision Amendment for the Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23) and Miscellaneous No Action Sites, Final Remedial Action, Operable Unit 1-07B* (DOE-ID 2001b). There is also an *Explanation of Significant Differences for the Record of Decision for the Test Area North Operable Unit 1-10* (DOE-ID 2003b).



Figure 4-2. Aerial view of the Technical Support Facility at Test Area North with the Contained Test Facility in the background.

4.2.1 Current State

Sites addressed in the OU 1-10 ROD (DOE-ID 1999a) include tanks, spills, pits, and disposal sites. Surface and subsurface contaminants include radionuclides (cesium-137, cobalt-60, strontium-90, and uranium isotopes), metals (barium, cadmium, chromium, mercury, and silver), and VOCs (benzene, toluene, ethylbenzene, xylene, and trichloroethene [TCE]). A map showing current hazards at TAN is shown in Figure 4-2a1. The two sites not displayed on the map are the IET-04 (IET Stack Rubble Site), located north of TSF, and TSF-39 (TSF Transite [Asbestos] Contamination), located northwest of TSF.

The OU 1-10 ROD (DOE-ID 1999a) addresses remedial actions for eight identified release sites within TAN that may present an imminent and substantial endangerment to human health and the environment. These sites include:

- Intermediate-Level (Radioactive) Waste Disposal System (TSF-09) and Contaminated Tank Southeast of Tank V-3 (TSF-18), referred to as the V-Tanks
- PM-2A Tank Contents and Contaminated Soils (TSF-26), referred to as the PM-2A Tanks
- TAN/TSF-1 Area (Soil Area) (TSF-06, Area B), referred to as the contaminated soil area
- TAN Disposal Pond (TSF-07)
- TSF Burn Pit (TSF-03) and WRRTF Burn Pits I, II, III, and IV (WRRTF-01), referred to as the burn pits
- WRRTF Fuel Leak (WRRTF-13), referred to as the fuel leak.

For the V-Tanks (TSF-09 and TSF-18) containing liquids and sludges, the OU 1-10 ROD is currently being amended. The potential COCs for the three tanks are metals (e.g., mercury, chromium, and lead), VOCs (e.g., tetrachloroethene, trichloroethene, and carbon tetrachloride), semivolatile organic compounds (e.g., polychlorinated biphenyls), and radionuclides (e.g., cesium-137, cobalt-60, strontium-90, and various isotopes of plutonium and uranium) (Blackmore et al. 1997; INEEL 1994). The proposed remedy will include removal and treatment of VOCs and semivolatile organic compounds by chemical oxidation; stabilization of the tank contents; removal of the tanks and piping; and disposal of the tank contents, tanks, and piping at the ICDF. The contaminated soil will be excavated and disposed of at the ICDF. The excavation will be backfilled and recontoured. Institutional controls consisting of signs, access controls, and land-use restrictions may be established and maintained depending on the results of postremediation sampling.

For the PM-2A Tank Contents and Contaminated Soils (TSF-26), the selected remedy is soil excavation, tank content removal and treatment (if needed), and disposal. This will include removal of the tanks and contents and disposal at the ICDF. TSF-26 remediation includes excavation of contaminated soil and disposal at the ICDF and backfill, contouring, and revegetation of the area. Institutional controls consisting of signs, access controls, and land-use restrictions may be established and maintained depending on the results of postremediation sampling.

For the soil contamination area (TSF-06, Area B), the selected remedy is excavation and disposal. Surface soil at this site was contaminated by windblown radioactive particles from the contaminated soil at the PM-2A Tanks site. The COC is cesium-137. This will include excavation of the contaminated soil; disposal at the ICDF; and backfill, contour, and revegetation of the area.

For the TAN Disposal Pond (TSF-07), the selected remedy is limited action, which included soil sampling at the end of use to determine the levels of cesium-137 present. The pond is currently in use and will undergo assessment when operations cease. Although contamination was left in place, it will naturally decay to acceptable levels within the 100-year institutional control period. Maintenance of existing institutional controls and environmental monitoring will continue until 2097 to allow the remaining cesium-137 to decay to acceptable levels.

For the TSF Burn Pit (TSF-03), the remediation will include removal of the contaminated soil; disposal at the ICDF; and backfill, recontour, and revegetation. No institutional controls will be required after remediation.

For the WRRTF Burn Pits (WRRTF-01), the remediation will consist of the application of a soil cap over Burn Pits II and IV with revegetation and institutional controls, based on the presence of asbestos above action levels. The remedy also includes placement of permanent granite monuments. Pits I and III no longer require remediation (soil covers) or institutional controls and are changed to no action sites.

Six release sites that potentially pose risks to human health are the TSF-06, Area B, contaminated soil area, the TSF-07 TAN Disposal Pond, the TSF-09 and TSF-18 V-Tanks soil contamination, the TSF-26 PM-2A Tanks soil contamination area, and the TSF-08 mercury spill. In addition, there are three sites (WRRTF-01 Burn Pits, TSF-03 Burn Pit, and WRRTF-13 Fuel Leak) that contain contaminants (i.e., cesium-137, asbestos, and petroleum hydrocarbons) at concentrations greater than regulatory limits. Four currently operational facilities (Radioactive Parts Security Storage Area Buildings TAN-647 and TAN-648 and Pads, TAN-607 Hot Shop Facility, and Radioactive Liquid Waste Treatment and Transfer/Storage Buildings [TAN-616 and TAN-666]) have been identified in the CERCLA ROD as having potential for producing releases in the future. All these sites are under institutional control, as well as 10 other sites.

There are two other sites with known radioactive contamination. The first site is TSF-06, Area 10 (the buried Heat Transfer Reactor Experiment vessel site), where contamination is fixed to the surfaces of a reactor vessel that is buried inside a vault located more than 10 ft below ground surface. The primary contaminants for this site are assumed to be cesium-137, cobalt-60, and strontium-90. The second site is IET-04 (the buried IET Stack Rubble Site), where contamination is fixed to the surfaces of stack rubble that also is buried greater than 10 ft below ground surface. The contamination at these two sites is not predicted to migrate away from the buried material, so it is not expected that humans or ecological receptors will be exposed to it.

Two other release sites, TSF-09 and TSF-18 (the V-Tanks) and TSF-26 (the PM-2A Tanks), contain highly contaminated liquid and sludge waste. These tanks were part of a system that collected and treated radioactive liquid waste from TAN operations, beginning with the Aircraft Nuclear Propulsion Program in the 1950s and early 1960s. The tanks contain various amounts and concentrations of radionuclides, organic compounds (including polychlorinated biphenyls), and inorganic compounds (including metals, such as mercury). There is no evidence that contamination has leaked from the tanks; however, the soil surrounding the tanks was contaminated by waste spilled during tank transfer operations.

A conceptual site model was developed as part of the *Comprehensive Remedial Investigation/Feasibility Study for the Test Area North Operable Unit 1-10 at the Idaho National Engineering and Environmental Laboratory* (Blackmore et al. 1997) and the *Comprehensive Remedial Investigation and Feasibility Study Supplement for the Test Area North Operable Unit 1-10 at the Idaho*

National Engineering and Environmental Laboratory (DOE-ID 1998a). This model, which has been updated to reflect 2003 conditions, is shown in Figure 4-2a2a.

The OU 1-07B ROD (DOE-ID 1995d) addresses remedial action for the TSF injection well (TSF-05) and surrounding groundwater contamination (TSF-23). The TSF injection well was used from 1953 to 1972 to dispose of TAN liquid waste into the fractured basalt of the Snake River Plain Aquifer. This waste included organic, inorganic, and low-level radioactive wastewater added to industrial and sanitary wastewater. The contaminants identified at concentrations above risk-based levels in the groundwater are organic TCE; cis- and trans-1,2-dichloroethene; and radionuclides (strontium-90, tritium, cesium-137, and uranium-234). OU 1-07B is defined as the groundwater beneath TAN that has, or is expected to have, concentrations of TCE above the Safe Drinking Water Act MCL. TCE is being used as the indicator constituent for defining the groundwater plume because it is the most widely distributed COC in TAN groundwater.

Exposure scenarios evaluated in the *Remedial Investigation Final Report with Addenda for the Test Area North Groundwater Operable Unit 1-07B at the Idaho Nuclear Engineering and Environmental Laboratory* (Kaminsky et al. 1994) considered industrial and residential long-term (chronic) exposures. Chronic exposures evaluated assumed contaminant exposures to workers over a 200-year period and to residents living in the study area over a 30-year period. The groundwater conceptual site model from the baseline risk assessment was updated to reflect 2003 conditions and is shown in Figure 4-2a2b.

A number of sites at TAN are under institutional control, and some will remain under institutional control after 2035. The WAG 1 sites currently under the institution control area are listed below:

- IET-04 Stack Rubble Pit—The COCs are radionuclides.
- TSF-03 Burn Pit—The COC is lead.
- TSF-05 Injection Well—The COCs are trichloroethene, other volatile organics, and some radionuclides.
- TSF-06, Area 1, TAN/TSF Soil Area, soil area—The COC is radionuclides. The radionuclides include cobalt-60, cesium-137, thorium-232, and uranium-238.
- TSF-06, Area 5, TAN/TSF Soil Area, Radioactive Soil Berm—The COC is radionuclides, including cobalt-60 and cesium-137.
- TSF-06, Area 11, TAN/TSF Soil Area, TSF-06 Ditch—The COC is radionuclides, including cobalt-60, cesium-137, and europium-154.
- TSF-06, Area B, TAN/TSF Soil Area, soil area—The COC is cesium-137.
- TSF-07 Disposal Pond—The COC is cesium-137.
- TSF-08 Heat Transfer Reactor Experiment III Mercury Spill Sites 13B and 13C—The COC is mercury.
- TSF-09 TSF Intermediate-Level (Radioactive) Waste Disposal System—The COC is cesium-137.
- TSF-10 Drainage Pond—The COCs are metals and radionuclides.

- TSF-18 Contaminated Tank Southeast of Tank V-3—The COC is cesium-137.
- TSF-23 Contaminated Groundwater Beneath TSF—The COCs are trichloroethene, other volatile organics, and radionuclides, including strontium-90, hydrogen-3, cesium-137, and uranium-234.
- TSF-26 PM-2A Tanks—The COC is cesium-137.
- TSF-28 Sewage Treatment Plan and Sludge Drying Beds—The COC is radionuclides.
- TSF-29 Acid Pond—The COC is radionuclides, including americium-241, curium-234/244, cesium-137, neptunium-237, and uranium-235.
- TSF-39 Transite (Asbestos) Contamination—The COC is asbestos.
- TSF-42 TAN-607 Room-161 Contaminated Pipe—The COC is radionuclides.
- TSF-43 Radioactive Parts Security Storage Area Buildings 647 and 648 and pads—The COC is radionuclides.
- WRRTF-01 Burn Pits I, II, III, and IV—The COC is lead.

Institutional controls consist of visible access restrictions, control of activities, and prevention of well drilling. During DOE control postoperations, the controls consist of access restrictions and control of activities and property lease requirements including control of land use if required based on results of remedial action. Institutional controls will be used indefinitely unless the site is released based upon documentation in a 5-year review.

TAN also has a number of tanks and other items identified as requiring characterization or closure under RCRA as identified in the VCO between the Idaho Department of Health and Welfare and the DOE. RCRA closure is the required action for TAN-616 Low-Level Radioactive Waste System (VCO number TAN-008) and tanks identified in VCO number TAN-005, including TAN-020 Heat Transfer Reactor Experiment Mercury Contamination Sump (Loss-of-Fluid Test Facility) and TAN-031 TSF Demineralized Water System.

4.2.2 End State

Facilities at TAN will be closed to industrial standards. By 2024, all facilities at TAN with no identified future use will be removed. WRRTF will be deactivated and decommissioned by 2008. The bulk of the Loss-of-Fluid Test Facility will be deactivated and decommissioned by 2022. TAN-607 Hot Shop will be deactivated by 2012 and decommissioned by 2018, with all remaining decommissioning at TAN completed by 2024 (not including NE-owned buildings). Items that pose no threat to occupants or that provide utilities to occupants will remain. These include roads, railroad tracks, drainage wells, drainage ponds, electrical substations, parking lots, paved lay-down areas, concrete or asphalt pads, fences, utility poles, utility lines, foundations below grade, uncontaminated underground piping, and berms. A map showing the risk-based end state for TAN is shown in Figure 4-2b1. TSF-39 (TSF-39 Transite [Asbestos] Contamination) will require institutional controls past 2035, but is not shown on the map because it is located too far from the other TAN facilities to be visible on the map.

Remediation of sites under the OU 1-10 ROD (DOE-ID 1999a) is planned to be completed by 2008, with the exception of potential contaminated soil under buildings or structures (i.e., collocated

facilities). For example, the V-Tank contents, tanks, and associated piping will be removed, and the surrounding soil will be excavated and disposed of. The TSF-07 Disposal Pond, the TSF-09 and TSF-18 V-Tanks soil area, the TSF-26 PM-2A Tanks soil area, the WRRTF-01 Burn Pits, the TSF-08 Mercury Spill Area, the TSF-10 Drainage Pond, and the TSF-39 TSF Transite Contamination Area may require institutional controls beyond 2035, depending on results of the 5-year reviews. A risk-based end state conceptual site model is shown in Figure 4-2b2a.

By 2035, active remedial action of the contaminated groundwater plume at TAN is expected to be complete. However, monitoring and maintenance of the residual plume and institutional controls will continue as part of the monitored natural attenuation remedy until the entire plume reaches the RAOs identified in the Fiscal Year 2001 *Record of Decision Amendment for the Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23) and Miscellaneous No Action Sites, Final Remedial Action, Operable Unit 1-07B* (DOE-ID 2001b). The timeframe identified for all remediation activities to be complete and for the plume to meet RAOs is 2095.

Cleanup of TAN groundwater involves application of three technologies to remediate three zones of the contaminated plume: in situ bioremediation (hot spot), pump and treat (medial zone), and monitored natural attenuation (distal zone). To implement the in situ bioremediation process, sodium lactate is injected into the aquifer to stimulate naturally occurring microbes in the subsurface to digest and break down contaminants. Pump-and-treat technology is used to extract contaminated groundwater from the aquifer, treat it to remove the hazardous constituents, and reinject clean water back into the aquifer. Monitored natural attenuation takes advantage of naturally occurring bacteria to break down the hazardous waste chemical, TCE, into harmless end products.

By 2035, monitored natural attenuation is anticipated to be the only portion of the remedial action still being used to clean up the contaminated aquifer. A risk-based end state conceptual site model is shown in Figure 4-2b2b. Analysis of groundwater data collected from 1989 to 1997 provided the basis for recommending monitored natural attenuation. By comparing TCE concentrations in the distal zone to those of two other contaminants, tetrachloroethene and tritium, it has been determined that TCE is degrading at a rate that will meet cleanup objectives. Monitoring data will be evaluated to verify that the aquifer will be restored by 2095.

4.2.3 Variances

A potential variance related to contaminated soil at TAN is discussed in Table 5-1. The ROD selected remedy was based on scenarios that included residential receptors after 100 years. It is proposed that an evaluation be conducted to determine the level of cleanup that would be required to protect occupational receptors, assuming no future residential use of the TAN site and surrounding area.

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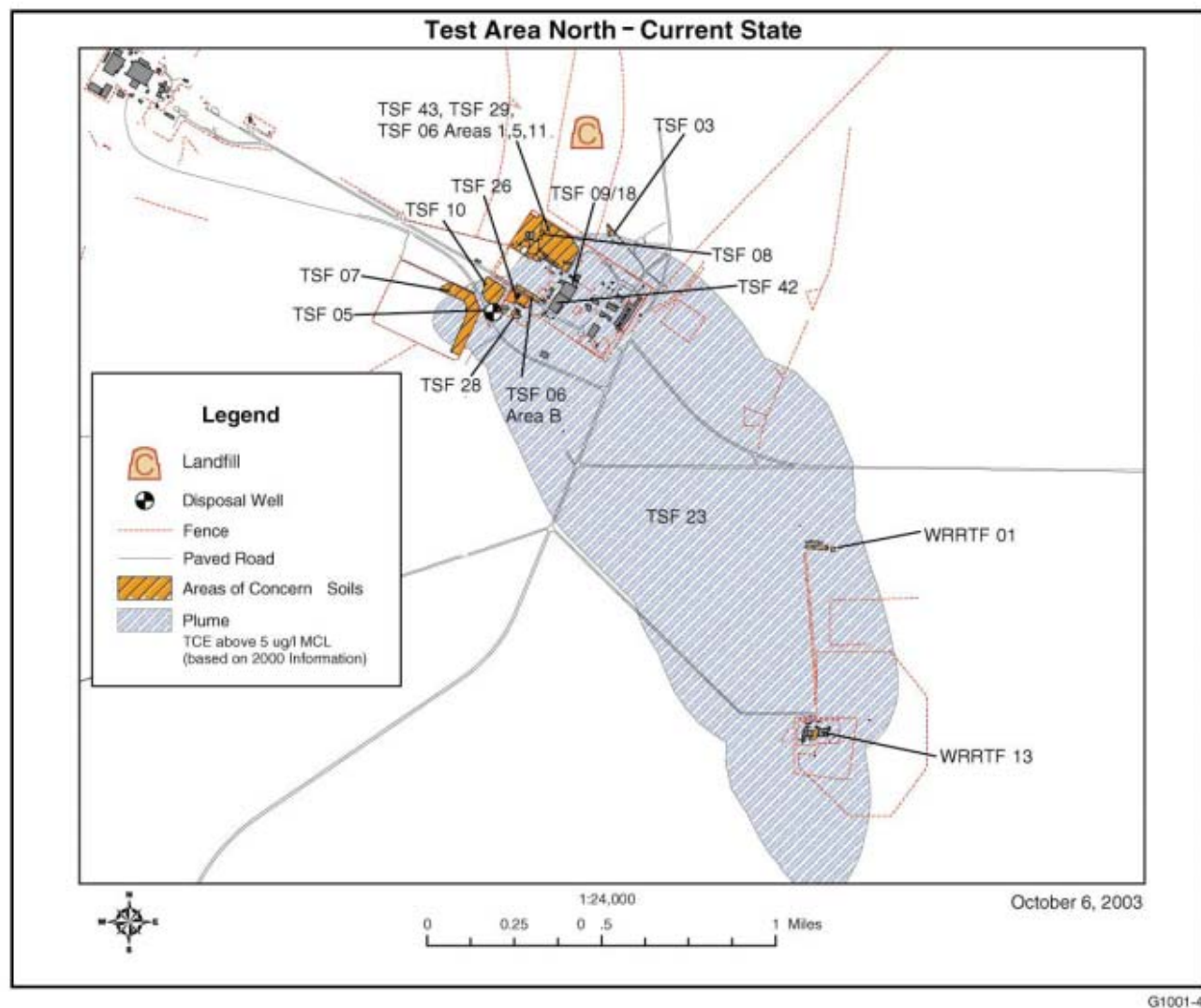
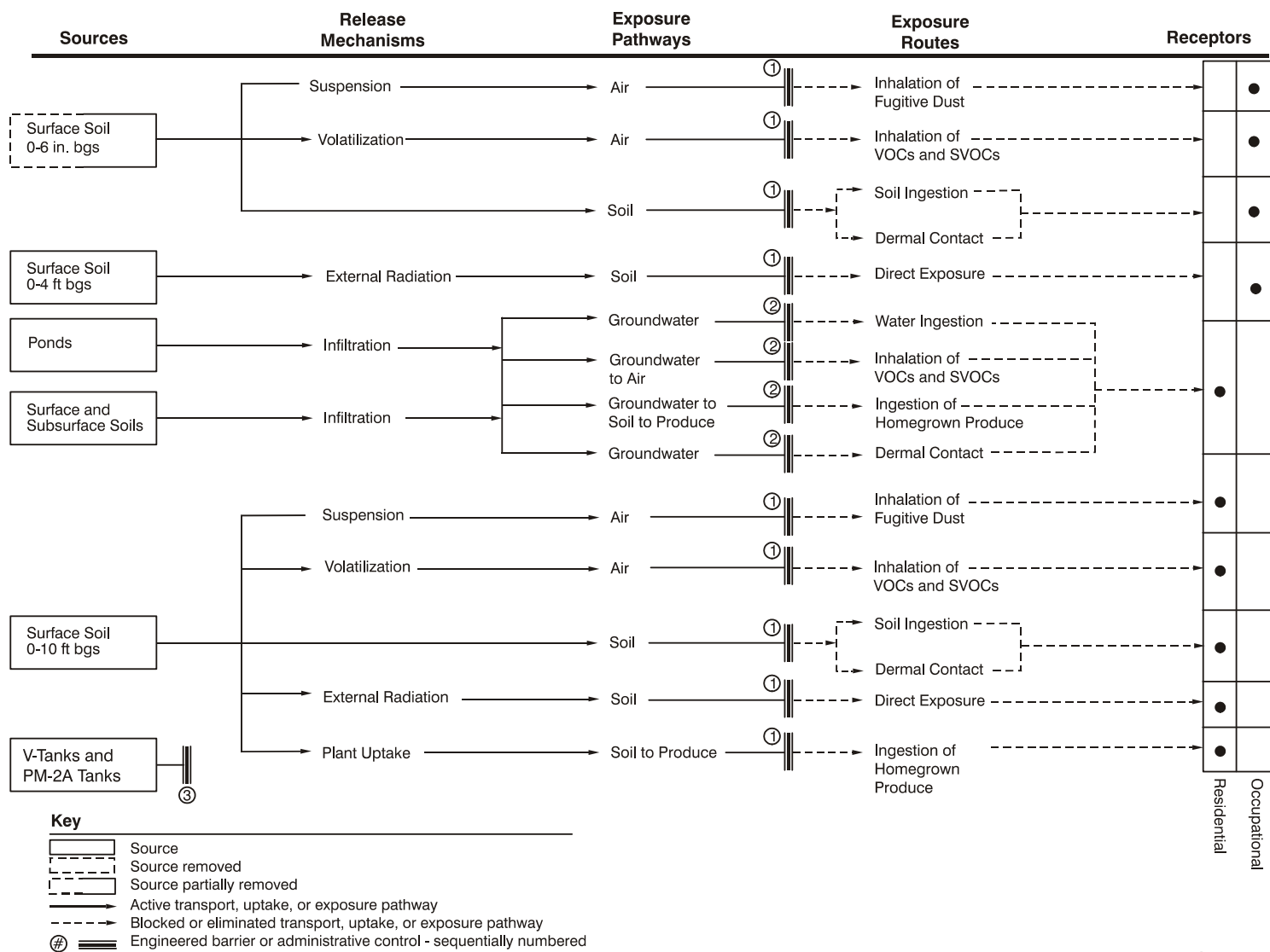


Figure 4-2a1. Test Area North map—current state.



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Figure 4-2a2a. Test Area North conceptual site model—current state.

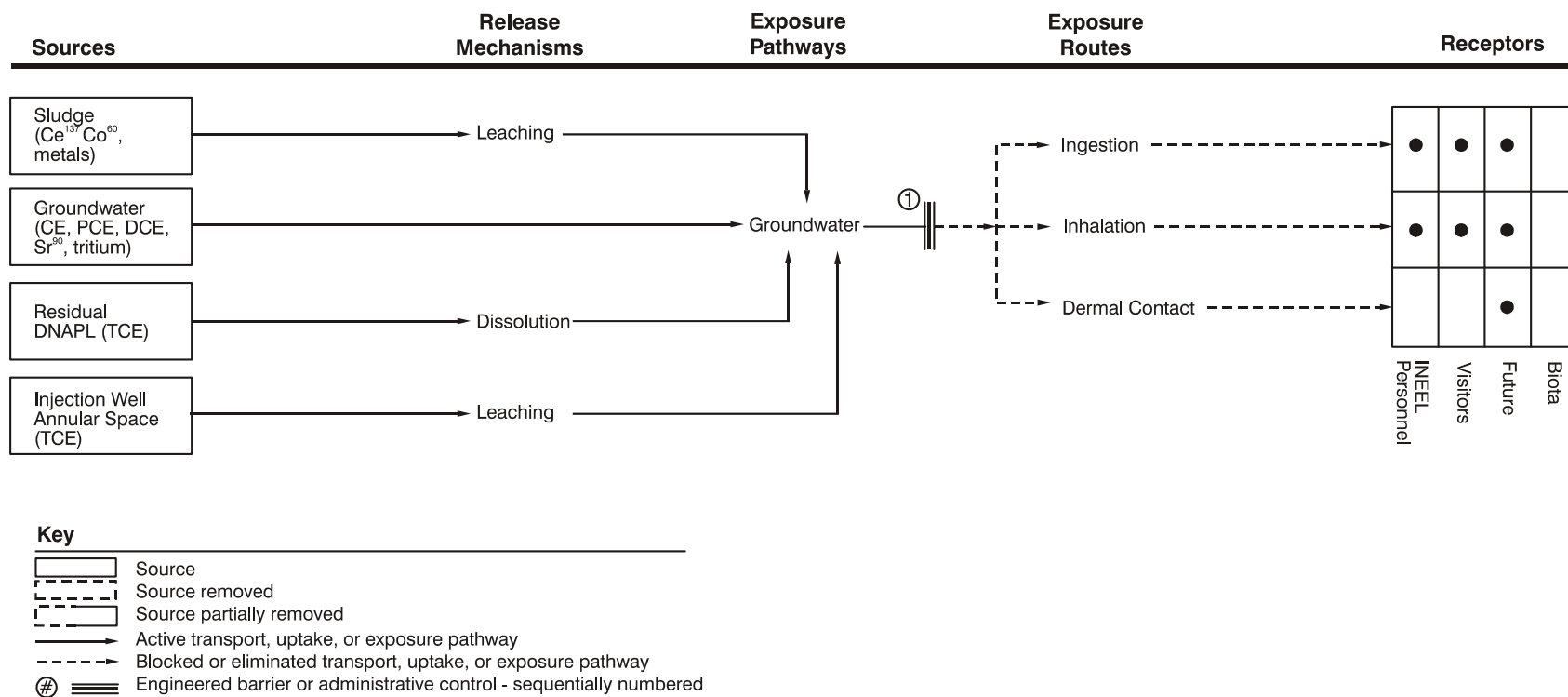
SVOC = semivolatile organic compound

Narrative for Figure 4-2a2a Test Area North Conceptual Site Model—Current State

The OU 1-10 ROD (DOE-ID 1999a) addresses remedial actions for eight identified release sites within TAN that may present an imminent and substantial endangerment to human health and the environment. To date, characterization activities and removal of approximately 532 m³ of contaminated soil have been performed.

The steps taken to mitigate or remove these hazards are as follows:

1. Sites that present an unacceptable risk to human health and the environment have institutional controls, and access is restricted. The entire INEEL Site has restricted access to prevent intrusion by the public. Workers are protected through posting of signs at contaminated sites, by recording contaminated sites in the Site institutional controls database, and through the work control process used to identify hazards and mitigation measures for planned work activities. The federal government will ensure that access and use restrictions are maintained and enforced until an acceptable risk level is attained.
2. The sites include the TSF-07 Disposal Pond, the TSF-10 Drainage Pond, and the TSF-29 Acid Pond. The TSF-07 Disposal Pond is an unlined disposal pond located southwest of TSF outside the facility fence. The TSF-07 Disposal Pond is currently in use and will undergo assessment when operations cease. The TSF-10 Drainage Pond is for surface water discharge. The TSF-10 Drainage Pond is a no further action site with institutional controls, because metals and low-level radionuclide contamination may be present. The TSF-29 Acid Pond is an unlined pond east of the Radioactive Parts Security Storage Area that received radioactive and treated wastewater from 1955 to 1958 in support of the Aircraft Nuclear Propulsion Program. In 1976, the TSF-29 Acid Pond was partially backfilled with soil containing radioactive particles from cleanup operations around TSF. It is also a no further action site with institutional controls. The sites are posted and have restricted access and use.
3. The V-Tanks buried at TSF-09/18 and the PM-2A Tanks buried at TSF-26 are currently administratively controlled. The sites are fenced and posted with signs that identify them as CERCLA sites. Entry into the sites requires radiological control precautions. The purpose of these controls is to keep worker exposures as low as reasonably achievable and to prevent the spread of contaminated soil. As-low-as-reasonably-achievable controls reduce occupational risks at these sites to acceptable levels. Risks from the tank contents were not evaluated in the *WAG-1 OU 1-10 Comprehensive Remedial Investigation/Feasibility Study Baseline Risk Assessment Technical Memorandum* (Burns 1995) because there is no evidence to indicate that the tanks have ever leaked. Therefore, potential pathways to receptors are not shown on the conceptual site model. Liquid-level measurements track the fluid levels in tanks V-1, V-2, and V-3. Tank contents were included in the site's feasibility study evaluation because they are so highly contaminated that they would produce unacceptable human health and ecological risks if they were to escape into the environment.



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Figure 4-2a2b. Test Area North groundwater conceptual site model—current state.

Ce¹³⁷ = cesium-137 DNAPL = dense nonaqueous phase liquid
 Co⁶⁰ = cobalt-60 PCE = tetrachloroethene
 DCE = 1,2-dichloroethene Sr⁹⁰ = strontium-90

Narrative for Figure 4-2a2b Test Area North Groundwater Conceptual Site Model—Current State

To implement the in situ bioremediation process, sodium lactate is injected into the aquifer to stimulate naturally occurring microbes in the subsurface to digest and break down contaminants. Pump-and-treat technology is used to extract contaminated groundwater from the aquifer, treat it to remove hazardous constituents, and reinject clean water back into the aquifer. Monitored natural attenuation takes advantage of naturally occurring bacteria to break down the hazardous waste chemical, TCE, into harmless end products.

The steps taken to mitigate or remove these hazards are as follows:

1. In situ bioremediation in the hot spot, pump and treat in the medial zone, and monitored natural attenuation in the distal zone. Occupational access will be restricted until completion of the remediation is verified by postremediation sampling. The entire INEEL Site has restricted access to prevent intrusion by the public. Workers are protected through posting of signs at contaminated sites, by recording contaminated sites in the Site institutional controls database, and through the work control process used to identify hazards and mitigation measures for planned work activities.

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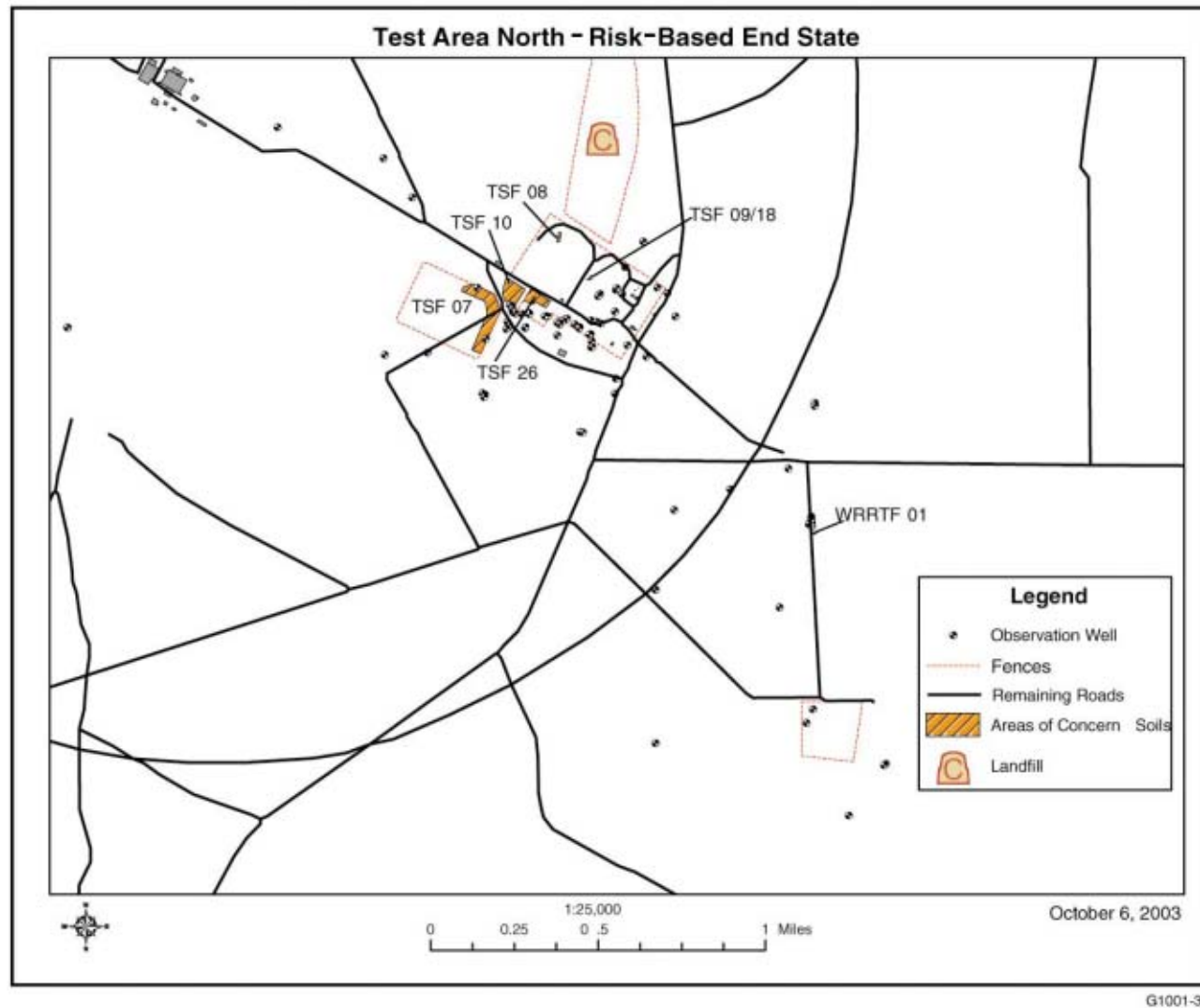
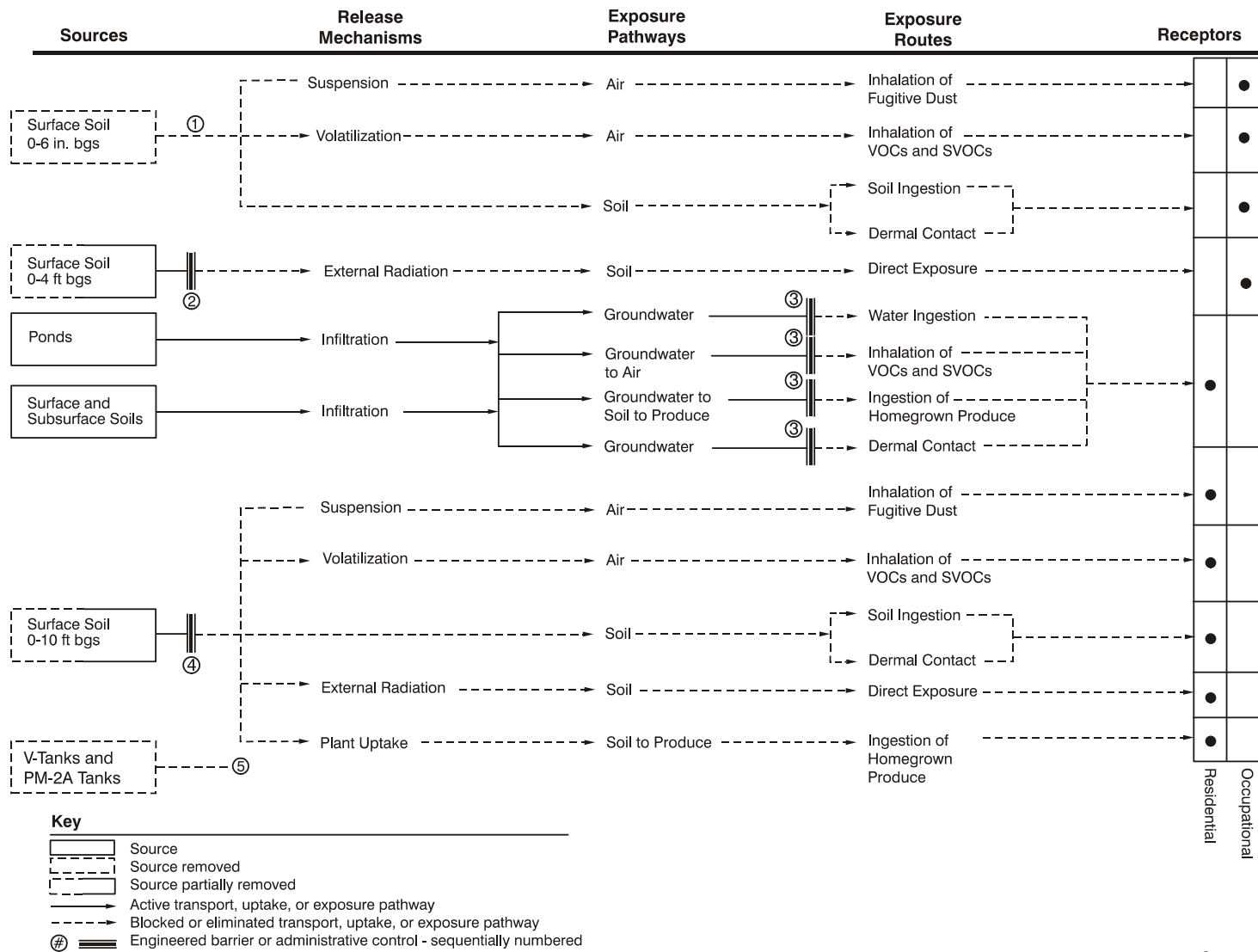


Figure 4-2b1. Test Area North map—risk-based end state.



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Figure 4-2b2a. Test Area North conceptual site model—risk-based end state.

SVOC = semivolatile organic compound

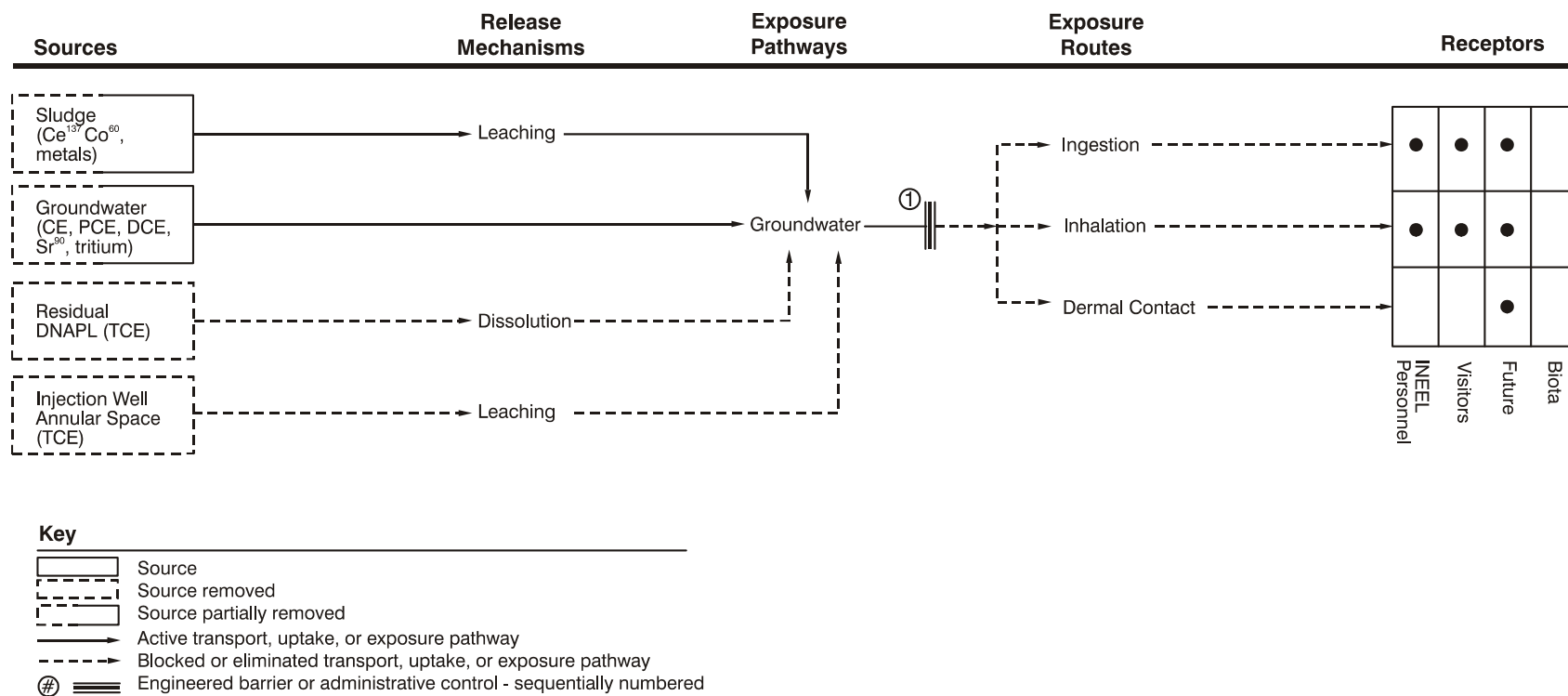
Narrative for Figure 4-2b2a Test Area North Conceptual Site Model—Risk-Based End State

Remediation of all sites under the OU 1-10 ROD (DOE-ID 1999a) is planned to be completed by 2008, with the exception of potential contaminated soil under buildings or structures (i.e., collocated facilities). For example, the V-Tank contents, tanks, and associated piping will be removed, and the surrounding soil will be excavated and disposed of. The TSF-07 Disposal Pond, the TSF-09 and TSF-18 V-Tanks soil, the TSF-26 PM-2A Tanks soil area, the WRRTF-01 Burn Pits, the TSF-088 Mercury Spill Area, the TSF-10 Drainage Pond, and the TSF-39 Transite Contamination Area may remain under institutional control beyond 2035 depending on results of the 5-year remedy effectiveness reviews.

The steps taken to mitigate or remove these hazards are as follows:

1. For the Surface Soil (0–6 in. bgs) contamination area (i.e., TSF-06, Area 3), the selected remedy is excavation and disposal. This will include excavation of the contaminated soil; disposal at the ICDF; and backfill, contour, and revegetation of the area. The source of contamination will be removed breaking the pathway by which a future receptor may be exposed.
2. For the Surface Soil (0–4 ft bgs) contamination areas (e.g., TSF-06, Areas 5, 7, 9, and 11 and Area B), the OU 1-10 ROD (DOE-ID 1999a) selected remedy is excavation and disposal. This will include excavation of the contaminated soil; disposal at the ICDF; and backfill, contour, and revegetation of the area. The source of contamination will be removed breaking the pathway by which a future receptor may be exposed. The OU 1-10 ROD (DOE-ID 1999a) selected remedy for some Surface Soil (0–4 ft bgs) contamination areas (e.g., TSF-29 and TSF-39) was no further action with institutional controls. These sites are posted and restrict occupational access and use.
3. Pond sites include the TSF-07 Disposal Pond, the TSF-10 Drainage Pond, and the TSF-29 Acid Pond. The OU 1-10 ROD (DOE-ID 1999a) selected remedy for these sites was limited action or no further action with institutional controls, since cesium-137 will decay to less than unrestricted land-use concentrations within 100 years. The sites are posted and have restricted access and use.
4. For the Surface Soil (0–10 ft bgs) contamination areas (e.g., LOFT-12 and TSF-06, Area 1), the selected remedy is excavation and disposal. This will include excavation of the contaminated soil; disposal at the ICDF; and backfill, contour, and revegetation of the area. The source of contamination will be removed breaking the pathway by which a future receptor may be exposed. The Surface Soil (0–10 ft bgs) site that may require institutional controls beyond 2035 is the TSF Mercury Spill Area, where it was reported that mercury leaked onto the ground and railroad system. This site was selected for a potential phytoremediation treatability study under WAG 10. In the *Explanation of Significant Differences for the Record of Decision for the Test Area North Operable Unit 1-10* (DOE-ID 2003b), Pits I and III no longer require remediation (soil covers) or institutional controls and are changed to no action sites. The remedy for Pits II and IV has been changed to native soil cover, and the COC is asbestos.

5. For the V-Tanks buried at TSF-09/18 and the PM-2A Tanks buried at TSF-26, the proposed remedy is soil and tank removal, ex situ treatment of tank contents, removal of ancillary lines and surrounding soil, and disposal. Institutional controls consisting of signs, access control, and land-use restrictions may be established depending on the results of sampling activities. Risks from the tank contents were not evaluated in the *WAG-1 OU 1-10 Comprehensive Remedial Investigation/Feasibility Study Baseline Risk Assessment Technical Memorandum* (Burns 1995) because there is no evidence to indicate that the tanks have ever leaked. Therefore, potential pathways to receptors are not shown on the conceptual site model.



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Figure 4-2b2b. Test Area North groundwater conceptual site model—risk-based end state.

Ce¹³⁷ = cesium-137 DNAPL = dense nonaqueous phase liquid
 Co⁶⁰ = cobalt-60 PCE = tetrachloroethene
 DCE = 1,2-dichloroethene Sr⁹⁰ = strontium-90

Narrative for Figure 4-2b2a Test Area North Groundwater Conceptual Site Model—Risk-Based End State

By 2035, active remedial action of the contaminated groundwater plume at TAN is expected to be complete. However, monitoring and maintenance of the residual plume and institutional controls will continue as part of the monitored natural attenuation remedy until the entire plume reaches the RAOs identified in the Fiscal Year 2001 *Record of Decision Amendment for the Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23) and Miscellaneous No Action Sites, Final Remedial Action, Operable Unit 1-07B* (DOE-ID 2001b). The timeframe identified for all remediation activities to be complete and for the plume to meet RAOs is 2095. The steps taken to mitigate or remove these hazards are as follows:

1. Monitoring and maintenance of the residual plume and institutional controls will continue as part of the monitored natural attenuation remedy until the entire plume reaches the RAOs. Occupational access will be restricted until completion of the remediation is verified by postremediation sampling. The entire INEEL Site has restricted access and use to prevent intrusion by the public. Workers are protected through posting of signs at contaminated sites, by recording contaminated sites in the Site institutional controls database, and through the work control process used to identify hazards and mitigation measures for planned work activities.